Gesture Based Interfacing

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Abstract— **This paper deals with the latest technology called the sixth sense. It's a wearable interface that augments the physical world around us with the digital information The Sixth Sense prototype comprises a pocket projector, a mirror and a camera contained in a pendant like, wearable device. Both the projector and the camera are connected to a mobile computing device in the user's pocket. The projector projects visual information enabling surfaces, walls and physical objects around us to be used as interfaces; while the camera recognizes and tracks user's hand gestures and physical objects using computer vision based techniques. The software program processes the video stream data captured by the camera and tracks the locations of the colored markers (visual tracking fiducially) at the tip of the user's fingers. The movements and arrangements of these fiducially are interpreted into gestures that act as interaction instructions for the projected application interfaces. Sixth Sense supports multi-touch and multi-user interaction.**

Index Terms— **camera, mobile device, projector, gestures**

I. INTRODUCTION

This technology is a revolutionary way to interface the physical world with digital information. Modern technologies include the touch screen techniques which is used widely and it makes ease of operation and saves utilization time. Sixth sense is a wearable gestural interface that augments the physical world around us with digital information and lets us use natural hand gestures to interact with that information. But the bottle necks of this method such as position of camera, for capturing gestures interprets the accuracy in the projected output, lead to use of commands instead of hand gestures. The position of camera is a major constraint in the image capturing and projected output efficiency and accuracy. Therefore the actions which we regularly perform in our daily life, are converted to commands and are trained to a speech IC .They are stored as a database in the integrated circuit and corresponding actions are performed when the speech is recognized from the user.

It's a hi-tech device seamlessly integrate Analog information with our every day physical world. The voice is directly performed into operation within fractions of

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seconds, and the action is projected on the surface. It's a portable device and eases the operation which we regularly perform. Basically the sixth sense technology concept involves the use of hand gestures .the finger tip will contain colored markers and hence gestures performed will be captured by the camera. Then it's given to the mobile device for the corresponding action to be performed. The action is projected on the surface through the projector. Software algorithms and computer vision technologies will be used to enable the action from the mobile device for the corresponding gesture captured in the camera. This gesture based technology is used for variety of applications like performing basic actions, locating points in the map, watching video in news paper, dialing number in hand etc. The slight modification of this method leads to the use of commands that is analog information into real world. The analog data is converted into digital and performed as action, as all times the hand gestures cannot be used.
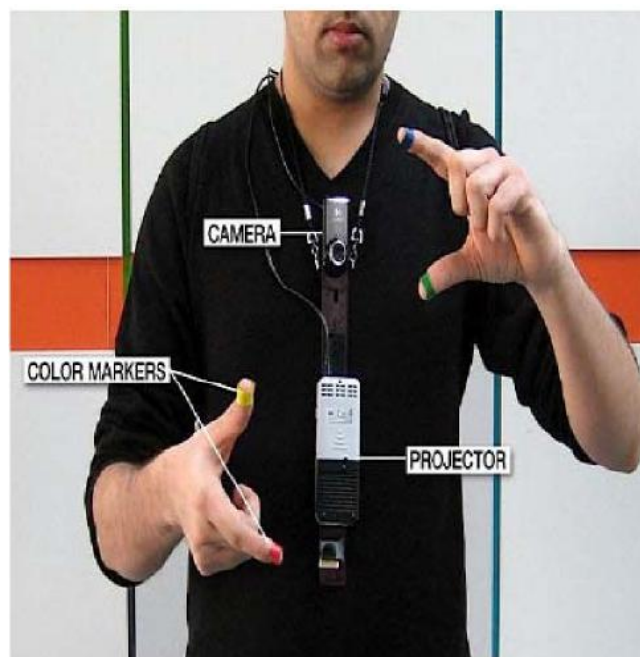

Fig1: Representation of Gesture Based Design

This was how the wearable device is fit to the human body. Here color markers are used in the finger tips .In our technology we use commands for performing the same operations. Many high technology speech integrated circuits evolved which makes our operation enhanced with more advanced features.
Allowing combined voice and gestural input has several tangible advantages. The first is purely practical-ease of

expression .Ease corresponds to the efficiency with which commands can be remembered and expressiveness, size of command vocabulary.

II.   MOTIVATION AND BACKGROUND

Previously many technologies evolved such as augmented reality which is to add information and meaning to real object or place. Unlike virtual reality, augmented reality does not create a simulation of reality instead it takes a real object or space as the foundation and incorporates technologies that add contextual data to deepen a person understanding of the subject. It's a term for live direct or indirect view of a physical real world environment whose elements are augmented by virtual computer generated imagery.

Gesture recognition is a term with a goal of interpreting human gestures through mathematical gestures and mathematical algorithms.

Computer vision is the science and technology of machines that is concerned with the theory behind artificial systems that extract information from the images. As a technological discipline, computer vision seeks to apply its theories and models to the construction of computer vision systems. The examples include the controlling processes, detecting events, organizing information, modeling objects or environments and interaction.

Recently speech integrated circuits evolved which is used widely in car automation and home appliances. It eases the operation and saves the utilization time of the manual operations performed by the human's every day. The speech recognition process is performed by a software component known as speech recognition engine. The primary function of this is to process the spoken input and translate it into text which the application understands. The application then can do one of the two things, 1 .The application can interpret the result of the recognition as a command, in this case application is a command and control application.2.If the application handles the recognized text as simply text, then it's considered as dictation application. When the user says something, it is known as utterance. An utterance is a stream of speech between two periods of silence. The speech IC can be used for all sorts of data, statistical models, and algorithms to convert spoken input into text.

III.   DESIGN AND WORKING

The sixth sense device comprises of
1. Wearable projector
2. Mobile device
3. Speech IC
4. Mirror

The sixth sense device is a mini projector coupled with a speech IC and a cell phone, which acts as a computer and our connection to the cloud, all the information stored on the web. The components are controlled by or communicated with a mobile computing device carried in the user's pocket. The hardware components are coupled in a pendant like mobile wearable device .both the speech IC and the projector are connected to the mobile computing device in the user's pocket. The projector, projects the visual information enabling surfaces, walls and physical objects around the user to be used as interfaces. While the speech IC stores commands which were trained by the user and executes the corresponding

action through the projector, enabling the actions from the mobile device.

A remote computer can also be connected which gathers data from user ,processes it, searches the web for relevant execution of the command and returns the result in real time to the user. The speech IC is trained with regularly used operating data and thus it acts as a database for storing all such commands.

There evolved many speech integrated circuits with fabulous technical aspects to be embedded for vast kind of applications. There are three ways for speech recognition and language understanding. 1. Multipurpose processors intended for embedded applications. 2. Customized integrated circuits for speech recognition and language undererstanding.3 .implementing speech recognition and language understanding as part of larger integrated circuit in the device.

Some integrated circuits can be used for less than 15 words, which have a menu based type of interaction whereas other ASIC integrated circuits can be used for hundreds of words which posses natural language understanding. The IC will be trained with a sophisticated neural network to recognize the commands and activate it correspondingly
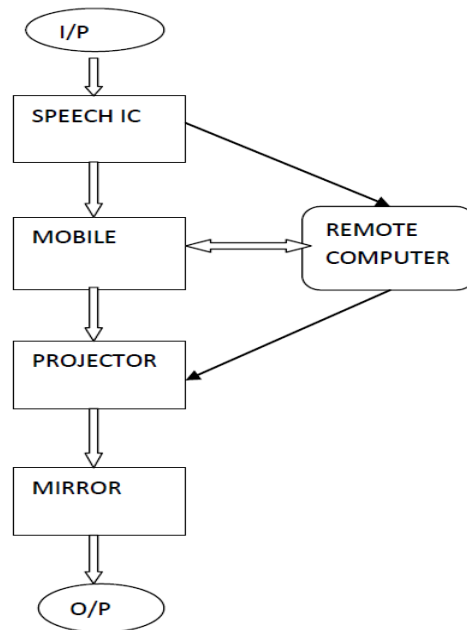

Fig 2: Basic Design of Our Concept

The speech IC is initially trained with the words or commands .The user gives the input as commands and when such analog speech is received to the IC ,the data is converted into digital and is sent to the mobile device .the mobile device activates the command and is given in turn to the projector. The projector output is seen on the screen through the mirror for accurate projection from the projector which is wearable in the body. For more advanced operations and for accessing net which is our future work, can be accessed from the remote computer simultaneously and projected as before.

IV.   APPLICATIONS

The Sixth Sense Technology finds a lot of applications in the modern world. The Sixth Sense devices bridge the gap by

bringing the digital world into the real world and in the process allowing the users to interact with the information without the help of any machine interfaces. Prototypes of the Sixth Sense device have demonstrated viability, usefulness and flexibility of this new technology. According to the words of its developers the extend of use of this new device is only limited by the imagination of human beings. Some practical applications of the Sixth Sense Technology is given below:

1. Viewing Map:
With the help of a map application the user can call upon any map of his/her choice and navigate through them by projecting the map on to any surface. By using the thumb and index fingers movements the user can zoom in, zoom out or pan the selected map.

2. Taking Pictures:
Another application of Sixth Sense devices is the implementation of a gestural camera. This camera takes the photo of the location user is
looking at by detecting the framing gesture. After taking the desired number of photos we can project them onto any surfaces and then use gestures to sort through those photos and organize and resize them.

3. Drawing Application:
The drawing application allows the user you to draw on any surface by tracking the fingertip movements of the user's index finger. The pictures that are drawn by the user can be stored and replaced on any other surface. The user can also shuffle through various pictures and drawing by using the hand gesture movements.

4. Making Calls:
We can make calls with the help of Sixth Sense device. The Sixth Sense device is used to protect the keyboard into your palm and using that virtual keypad we can make calls to anyone.

5. Interacting with physical objects:
The Sixth Sense system also helps to interact with physical objects we use in a better way. It augments physical objects by projecting more information about these objects projected on them. For example, a gesture of drawing a circle on the user's wrist projects an analog watch on the user's hand. Similarly a newspaper can show live video news or dynamic information can be provided on a regular piece of paper.

6. Getting Information:
Sixth Sense devices can be used for getting various information relating to our everyday life by getting in contact with objects.

(a) Product information:
Sixth Sense Technology uses marker technology or image recognition techniques to recognize the 213objects we pick in our hand and then provide information relating to the product.

(b) Book Information:
By holding and shuffling through the book pages, the Sixth Sense provides Amazon ratings on that book, other reviews and other relevant things related to the book.

(c) Flight Updates:
With the help of the Sixth Sense Technology it is no longer required to log into any sites for checking the status of the flights. The system will recognize your boarding pass and let you know whether the flight is on time or not.

7. Sixth Sense also lets the user draw icons or symbols in the air using the movement of the index finger and recognizes those symbols as interaction instructions.

V. ADVANTAGES

1. Portable:
One of the main advantages of the Sixth Sense devices is its small size and portability. It can be easily carried around without any difficulty. The prototype of the Sixth Sense is designed in such a way that it gives more importance to the portability factor. All the devices are light in weight and the Smartphone can easily fit into the user's pocket Support Multi touch and Multi user interaction:

Multi touch and Multi user interaction is another added feature of the Sixth Sense devices. Multi sensing technique allows the user to interact with system with more than one finger at a time. Sixth Sense devices also in-corporate Multi user functionality. This is typically useful for large interaction scenarios such as interactive table tops and walls.

2. Cost Effective:

The cost incurred for the construction of the Sixth Sense prototype is quite low. It was made from parts collected together from common devices. And a typical Sixth Sense device costs up to $300. The Sixth Sense devices have not been made in large scale for commercial purpose. Once that happens it's almost certain that the device will cost much lower than the current price.

3. Data access directly from the machines in real time: With the help of a Sixth Sense device the user can easily access data from any machine at real time speed. The user doesn't require any machine-human interface to access the data. The data access through recognition of hand gestures is much easier and user friendlier compared to the text user interface or graphical user interface which requires keyboard or mouse.

4. Mind map the idea anywhere:

With the advent of the Sixth Sense device, requirement of a platform or a screen to analyze and interpret the data has become obsolete. We can project the information onto any surface and can work and manage the data as per our convenience.

5. Open Source Software:

The software that is used to interpret and analysis the data collected by the device is going to be made open source as said by its inventor. This will enable other developers to contribute to the development of the system.

VI. CONCLUSION

The sixth sense technology using gesture movement and speech integrated circuits are emerging innovative ideas. We have a seamless access to data or information that may exist to help us make decisions. This provides access to relevant information about the things in the environment and enables the new interactions between the real world and the world of data. Although the miniaturization of computing devices allows us to carry computers in our pockets, there had been no link between the digital devices we carry and our interactions with the physical world, and our speech in a efficient level.

Sixth sense is developed to seamlessly integrate information into reality. The future may depend upon this sixth sense. May be within this 2020, the proliferation and the use of this technology is immense. Sufficient awareness of the sixth sense will lead to further development of any technology which aids for getting information and performing any type of action practically at any time, using simply the gestures and commands given.

The advantage of this technology is portable, its connectedness between the world and the information as speech. Its cost effectiveness and data can accessed from the machine directly in real time. It can also be said as an open source technology. Within twenty years this technology will [7] bring a drastic change in field of science and will create a revolutionary change among the mass.

ACKNOWLEDGEMENT

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